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FOR A FRAMEWORK CONVENTION ON CLIMATE CHANGE

EXECUTIVE SUMMARY OF THE NATIONAL COMMUNICATION OF

NORWAY

submitted under Articles 4 and 12
of the
United Nations Framework Convention on Climate Change

In accordance with decision 9/2 of the Committee, the interim secretariat is to make available, in the official languages of the United Nations, the executive summaries of the national communications submitted by Annex I Parties.

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Copies of the Norwegian national communication can be obtained from:
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NORWAY

1. This report is the first national communication presenting Norwegian climate policy according to the commitments under the Framework Convention on Climate Change.

Inventory of Anthropogenic Emissions and Sinks of Greenhouse Gases in Norway

2. The following gases are included in the Norwegian inventory of emissions of greenhouse gases and biotic CO_2 sinks: carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), tetrafluoromethane (CF_4), hexafluoroethane (C_2F_6), sulphur hexafluoride (SF_6) and HFCs. Emission data for precursors (NOx, CO and NMVOCs) are also given. Emission figures for 1990 as well as historical trends are given for all greenhouse gases and precursors.

3. As a rule, the estimation methods follow the Draft Guidelines for national greenhouse gas inventories published by the Intergovernmental Panel on Climate Change (IPCC). However, where appropriate other estimation methods have been used to achieve a better and more complete presentation of our greenhouse gas emissions. The methodology is documented in the attached report by the Norwegian Pollution Control Authority (SFT report 94:02).

4. A greenhouse gas emission inventory for the period 1989 to 1993 is summarized in Table 1. The figures for CO_2 emissions in Table 1 are based on fuel sold. The figure for 1993 may be an overestimation because a major change was introduced in the tax system for diesel, making diesel for road traffic significantly more expensive and leading to an accumulation of stocks.

5. Figure 1 indicates historical trends from 1985 to 1993 in the emissions of greenhouse gases given as CO_2 equivalents, based on Global Warming Potential (GWP) values. CO_2 is by far the most important gas, accounting for approximately 70% of the total greenhouse gas emissions. Methane and nitrous oxide contribute about 13% and 8%, respectively. The "new" fluoridized gases (PFCs and SF_6) together contribute 8% of the total emissions. During the period from 1985 to 1993 total emissions peaked in 1986-1988, partly as a result of high SF_6 emissions.

6. Mobile sources account for the largest proportion of CO_2 emissions in Norway. In 1993, road traffic contributed about 24 % of the total CO_2 emissions and coastal traffic and fishing about 10 %. Oil and gas production activities, including burning of oil and gas on stationary and mobile oil rigs, emissions from gas processing and leakage of hydrocarbons, accounted for about 23 %. Industrial processes, i.e. production of metals, carbides, cement etc., generated 18 % of the total CO_2 emissions.

7. It is estimated that, the annual net anthropogenic sink of CO_2 in forests in Norway is 12 million tonnes, corresponding to about 35% of Norway's total CO_2 emissions. This significant Norwegian sink is mainly caused by an annual increase in the standing volume of Norwegian forests.

Policies and measures

8. Norway's climate policy is founded on the ultimate objective of the Climate Convention and the scientific understanding of the greenhouse effect set out in the reports from the UN Intergovernmental Panel on Climate Change (IPCC). An important principle of Norwegian climate policy is that all policies and measures, at both national and international level, should be as cost-effective as possible. Coordinated international efforts and the development of formalized international mechanisms are essential in dealing with the greenhouse effect.

9. Norway ratified the Climate Convention on 9 July 1993. As the Convention is further developed, Norway will continue to advocate the need for new and more binding commitments, as well as flexible mechanisms for their implementation. There should be a special focus on the period beyond the year 2000, in order to develop policies in accordance with the objective of the Convention to stabilize the greenhouse gas concentrations in the atmosphere "at a level that would prevent dangerous anthropogenic interference with the climate system."

10. Norway's current target regarding national CO_2 emissions is as follows: "CO_2 emissions are to be limited so that they do not exceed the 1989 level in the year 2000. This target is preliminary and will be considered in the light of further studies, technological advances, developments in the international energy markets and international negotiations and agreements."

11. Norway has been at the forefront of efforts to introduce economic instruments to limit emissions to air for a number of years. In 1991 the Government introduced a CO_2 tax on oil, natural gas and coal for energy use as a first step towards a comprehensive national climate policy. The CO_2 tax on petrol and natural gas used in petroleum exploration offshore was raised in 1992 and is now equivalent to about 20 dollars per barrel of oil. The Government is also promoting more efficient production and use of energy.

12. As a follow up of the commitments set out in the Climate Convention and the national target regarding CO_2 emissions, the Government is preparing a report to the Storting (the Norwegian national assembly) on policies and measures to limit emissions of greenhouse gases and enhance CO_2 sinks. The Government intends to present the report by the turn of the year. The report will contribute towards a more integrated climate policy, addressing all relevant greenhouse gases and economic sectors in accordance with the guiding principles of the Convention. Relevant measures, both economic and administrative consistent with the Governments overall economic strategy, will be considered with the aim of finding cost-effective ways of limiting net emissions of greenhouse gases in all sectors. Taxes on CO_2 are the most important means of limiting CO_2 emissions. The Government will intensify cooperation with the energy and industrial sectors, for instance by taking the initiative for voluntary agreements including surveys and declarations of intent to reduce emissions exempted from the CO_2 tax.

The Norwegian Co_2 Tax Scheme

13. The Norwegian environmental tax system consists primarily of product taxes, which in many instances may be a suitable approximation to emission taxes, e.g. for emissions of CO_2,

SO_x and lead. These emission components are already reflected in the tax system for fossil fuels. Both the petrol and the mineral oil tax contain a CO_2 element. A carbon tax has also been introduced for gas and oil combustion on the continental shelf, and from 1 July 1992 a carbon tax was introduced for certain applications of coal and coke. About 60% of the national CO_2 emissions are currently subject to such taxes. Table 2 shows the tax rates for petroleum products, gas, coal and coke as of 1 September 1994.

14. Norwegian CO_2 emissions increased substantially from 1960 to 1980. Throughout the 1980s, emissions were relatively stable. From 1989 to 1991 emissions were reduced by about 4 %, primarily because of a reduction in the consumption of gasoline and fuel oils and reduced production of metals. In addition to the CO_2 tax, implemented with effect from 1991, the ample supply of electric power and low economic activity contributed to this development. From 1991 to 1993, CO_2 emissions increased. This is mainly explained by increased oil and gas production and pipeline transport.

Energy Policy and Energy Efficiency

15. A new Energy Act entered into force on 1 January 1991. The Act lays down general terms and conditions designed to ensure more efficient utilization of electricity, which is mainly produced using hydro power. The Act involves deregulation and keener competition in the electricity sector. The power market has seen considerable changes since the introduction of the new Energy Act. Growing competition has had a pronounced effect on electricity prices and has contributed to a switch from oil to hydro electricity for heating.

16. In 1993 Norway introduced a change in its energy efficiency policy based on a report to the Storting. Norwegian policy is now shifting away from extensive grant schemes towards more cost-effective measures. The main activities in the years to come in the field of energy efficiency will be information, education and the introduction of energy-efficient technology.

Energy Production

17. Almost all electricity produced on the Norwegian mainland is based on hydro power, and most emissions of CO_2 from energy production are generated from offshore petroleum production and pipeline transport.

18. The use of more energy-efficient gas turbines has reduced emissions of CO_2 per unit of petroleum products produced. The efficiency of power generation in the petroleum sector has grown by 50% since 1975. Heat recovery systems have been installed on some offshore installations, thus improving energy efficiency. Flaring of gas has been reduced substantially compared to the level of production, and much less gas is flared in the Norwegian petroleum sector than in other comparable countries. The CO_2 tax applied to flaring and burning of natural gas and diesel in the petroleum sector is believed to have contributed to more energy-efficient production and has encouraged the development of projects and technical solutions to reduce CO_2 emissions offshore. These emissions increased by only 2.5% from 1990 to 1993, whereas petroleum production increased by 24% during the same period.

Transport

19. The CO_2 tax is the main instrument for limiting CO_2 emissions from the transport sector. However, the demand for transport oils is influenced by the total tax burden on these products, regardless of why they are imposed. Norwegian taxes on transport oils are among the highest in the world, currently 4.19 NOK/l petrol and 2.93 NOK/l diesel. VAT is not included in these figures. Petrol taxes have been gradually increased throughout the 1990s and are now more than 50 per cent higher than in 1990.

20. The introduction of the CO_2 tax and the general growth in tax rates have contributed to a considerable reduction in petrol consumption, but a number of other transport policy measures described in the report also contribute to reductions of CO_2 emissions from this sector. The CO_2 emissions dropped by more than 5 per cent between 1990 and 1993.

21. In the shipping sector, domestic ferries and passenger ships have been subject to the CO_2 tax since 1992.

Industry

22. CO_2 emissions from energy use in industry have decreased considerably as a result of improved energy efficiency and changes in the energy mix. Emissions of perfluorized carbons (PFCs) from aluminium producers have been reduced by 43% since 1985. Emissions of sulphur hexafluoride (SF_6) dropped considerably from 1987 to 1992 as a result of reduced emissions from magnesium production. In 1986-87 these emissions were almost 10 times higher than in 1992. From 1990 to 1993, emissions of nitrous oxide (N_2O) were reduced by 12%, mainly by improvements in production processes.

Landfills

23. The Government has introduced new guidelines for discharge permits for landfills to control the extraction and combustion of methane. Eight plants were in operation in 1993, and these have reduced emissions of methane by a total of more than 10 000 tonnes.

Projections

Projections of CO_2 Emissions

24. The projections of Norwegian CO_2 emissions are based on macroeconomic model projections supplemented with sectoral studies for some sectors (e.g. transport and petroleum production).

25. Emissions of CO_2 are expected to rise by about 12% by the year 2000 taking the effects of the CO_2 tax into account, according to the Government's Long-term Programme 1994-1997. About 65% of this rise is due to the expected increase in gas production and transport, which is all exported.

Projections of Emissions of Non-CO_2 Gases

26. Projections of emissions of CH_4 and N_2O are also based on the reference scenario in the Government's Long-term Programme 1994-97. Projections of emissions of the perfluorinated carbons (CF_4 and C_2F_6), sulphur hexafluoride (SF_6) and HFCs have been prepared on the basis of figures collected from the relevant branches and industrial enterprises.

27. Table 3 presents emissions and projected emissions of CO_2, methane, nitrous oxide, perfluorinated carbons, sulphur hexafluoride and HFCs.

Vulnerability Assessment and Adaptation Measures

28. Until now, most attention has been focused on effects on ecosystems and their vulnerability to climate change. The main findings are presented in chapter 4 of the report. In addition to climate change caused by increases in mean temperature, Norway may, because of its geography and long coastline, be particularly vulnerable to changes in the frequency of weather patterns and extreme events such as storms, floods and spring tides. Further investigations are needed, both on the possible relation between changes in the frequencies of such extreme events and global climate change on the ecological and socioeconomic impacts of such changes.

Research and systematic observation

29. A wide range of universities and research institutes from various disciplines have been engaged in different aspects of research related to climate change in Norway. The bulk of public and private funding goes into technological research and development, but there is also considerable activity in basic natural sciences, economics and social sciences. The Norwegian Climate and Ozone Research Programme was established in 1989, and is run by the Research Council of Norway. Several Norwegian research groups are collaborating to model atmospheric chemistry and the role of oceans. The Norwegian Institute of Air Research measures concentrations of greenhouse gases at the Arctic station in Ny-Ålesund on Svalbard. Norwegian institutes are doing research in several fields relevant to the objectives of the International Geosphere-Biosphere programme and other international global climate change programmes. Several Norwegian scientists have contributed to the IPCC assessments. The Centre for International Climate and Energy Research (CICERO) was established in 1990 to undertake climate-related research in all relevant disciplines. Policy-oriented studies related to the climate change issue also form a major part of a research programme named "Society, environment and energy" initiated by the Research Council of Norway. The Institute for Energy Technology (IFE) in Norway is participating in energy modelling work coordinated by the International Energy Agency (IEA). Norway has also strongly emphasized research on economic issues related to climate change, inter alia cost-effective mitigation measures.

Education, Training and Public Awareness

30. The work of the World Commission on Environment and Development awoke public

interest in issues related to climate change in Norway from the late 1980s. The attention focused on the importance of sustainable development and the need for all individuals to consider their own contributions to improvement of the environment have raised the level of awareness in many sectors of Norwegian society.

31. The negotiations on the Climate Convention are being followed closely by leading Norwegian newspapers and magazines. During the 1990s, the teaching of subjects related to environmental issues including climate change has been improved throughout the Norwegian educational system, from primary schools to universities.

32. The Norwegian Information Centre for Energy Efficiency (OFE) has during the 1990s arranged training courses and seminars in energy efficiency. The Government has also launched three large information campaigns on energy efficiency. Together with the other EU and EFTA countries, Norway will implement a system of energy labelling of electrical household appliances.

Joint Implementation of Measures to Mitigate Climate Change

33. Joint implementation of climate measures with other Parties is an option under the Climate Convention. For Joint Implementation to become a fully operational mechanism under the Convention, there is a need to agree on criteria, inter alia to ensure the proper monitoring, verification, validity and long-term effectiveness of such measures, and to agree on institutional arrangements under the Convention for these purposes. To facilitate the development of such criteria there is a need to gain practical experience of Joint Implementation activities, including ways of designing Joint Implementation projects, types of agreements and standard methods of calculating emission reductions.

34. To this end, Norway, in cooperation with the Global Environmental Facility (GEF), Poland and Mexico, is currently running two pilot projects intended to demonstrate the potential for joint implementation of measures to mitigate climate change. The experience gained through such projects may prove valuable to the Conference of the Parties (COP) in the process of establishing operational criteria for joint implementation. In addition, Norway is taking part in several other international activities in the field of climate change, as described in chapter 8 of the report.

Table 1. **Total emissions of greenhouse gases in Norway.**
1989-1993 and percentage change from 1989-1993.

	CO_2	CH_4	N_2O	CF_4	C_2F_6	SF_6	HFC_{134a}	HFC_{152a}	CO_2-Equ.
Year	Mtonnes	Ktonnes	Ktonnes	tonnes	tonnes	tonnes	tonnes	tonnes	Mtonnes
1989	35.2	287	16	360	16	107.2	n.a.	n.a.	50.2
1990	35.6	289	16	369	16	91.5	0	3	50.2
1991	34.0	289	15	313	14	86.4	1	3	48.1
1992	34.3	293	13	242	11	28.9	2	3	46.4
1993 1)	35.5	294	14	254	11	31.3	31.2	1	48.1
1989-1993	0.8%	2.4%	-14%	-29%	-30%	-71%	..	..	-4%

1) Preliminary figures

Sources: Statistics Norway and Norwegian Pollution Control Authority.

Figure 1. **Greenhouse gas emissions in Norway. 1985-1993.**
Million tonnes CO_2 equivalents.
Sources: Statistics Norway and Norwegian Pollution Control Authority.

Graph not available. See full text of communication.

Table 2. **Tax rates for petroleum products (NOK/l), gas (NOK/Sm3) and coal and coke (NOK/kg).**

	Basic tax	CO_2 tax	SO_2 tax	Total	CO_2 tax per kg CO_2 emitted
Unleaded petrol	3.12	0.82		3.94	0.35
Leaded petrol	3.78	0.82		4.60	0.35
Autodiesel	2.45	0.41	0.07	2.93	0.16
Mineral oil	0	0.41	0.07 1)	0.48	0.16
Diesel, North Sea	0	0.82	0	0.82	0.31
Gas, North Sea	0	0.82		0.82	0.35
Pit coal	0	0.41		0.41	0.17
Coal coke	0	0.41		0.41	0.13
Petroleum coke	0	0.41		0.41	0.11

1) The tax rate is 0.07 NOK per 0.25 per cent SO2 content. (1 USD equals about 7 NOK).

Table 3. **Emissions of the various greenhouse gases.**
1989, 1990, 1993 and projections for 2000. Million tonnes CO_2-equivalents.

	1989	1990	1993[1)]	2000	Changes 1989-2000
Total	50.1	50.2	48.1	52.9	+6%
Methane	6.6	6.7	6.8	6.4	-2%
Nitrous oxide	4.3	4.2	3.8	4.4	+4%
PFCs	2.0	2.1	1.5	1.4	-26%
Sulphur hexafluoride	2.0	1.7	0.5	0.6	-71%
HFCs	0.0	0.0	0.0	0.6	..

1) Preliminary figures